

# JAPAN MOVES TO GREEN: NATURAL DISASTER EMPOWERS JAPANESE CITIZENS

Teruyo Omura\*

## Abstract

*This paper examines how the 2011 Tsunami and Fukushima disaster has affected Japanese public opinion towards the government's energy policy. These events are interpreted as moving Japan and public opinions towards more sustainable and ecologically friendly energy technologies. Nuclear energy had been a national strategic priority since 1973. Development of the new fast-breeder reactor technology was backed by powerful government ministries, the Japan Atomic Energy Agency and the Federation of Electric Power Companies. Electricity supply from nuclear power was expected to increase to 40% by 2019. This is now under review. The 2011 disaster had a major and disruptive effect on energy supply in Japan. The Tokyo Electric Power Company in Fukushima supplied electricity to eight prefectures that were responsible for 40% of Japanese GDP. This research has monitored media coverage both in Japan and internationally and also public information and government documents in both Japanese and English. It has been found that Japanese society is now questioning the nuclear energy policy and is starting to focus on energy saving strategies leading to sustainable lifestyles. Japan is moving on from grieving to focusing on finding new solutions to its community problems and striving to go nuclear-free.*

Keywords: Government Policy; Public Opinion; Natural disaster

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\*University of Southern Queensland, Faculty of Business and Law, School of Accounting, Economics and Finance, Springfield, Queensland, AUSTRALIA, Ph#: +61 07 3470 4536,  
Email: [teruyo.omura@usq.edu.au](mailto:teruyo.omura@usq.edu.au)

## **1. Introduction**

The Ginza is the famous central business district of Tokyo and one of the best known shopping areas in the world. It used to be brightly lit at night, when it was most frequently photographed, but now this darker view is what Tokyo looks like at night. Lights have gone out all over Japan since the Tsunami of 2011 (Shears 18 March 2011).

This is the first time in history except during the Second World War, that Japan has been faced with electricity shortages and blackouts. Now everyday life has changed, almost solely because of the destruction of the Fukushima nuclear power plant. The Japanese government has estimated the total value of the property destruction at 16.9 trillion yen (3-5% of GDP). This does not include the cost of the damage caused by nuclear radiation, such as the cleanup, compensation and the lost power supply from the Tokyo Electric Power Company (TEPCO) to the eight prefectures which accounted for 40% of Japanese GDP (Government of Japan 2012).

## **2. Japan's use of nuclear energy with some background**

The first commercial nuclear power reactor began operating in Japan in the middle of 1966 (World Nuclear Association 2012). By 2011, Japan's 50 main reactors were providing some 30% of Japan's electricity (Acton & Hibbs 2012). Japan has a full fuel cycle set-up, including enrichment and reprocessing of used fuel for recycling.

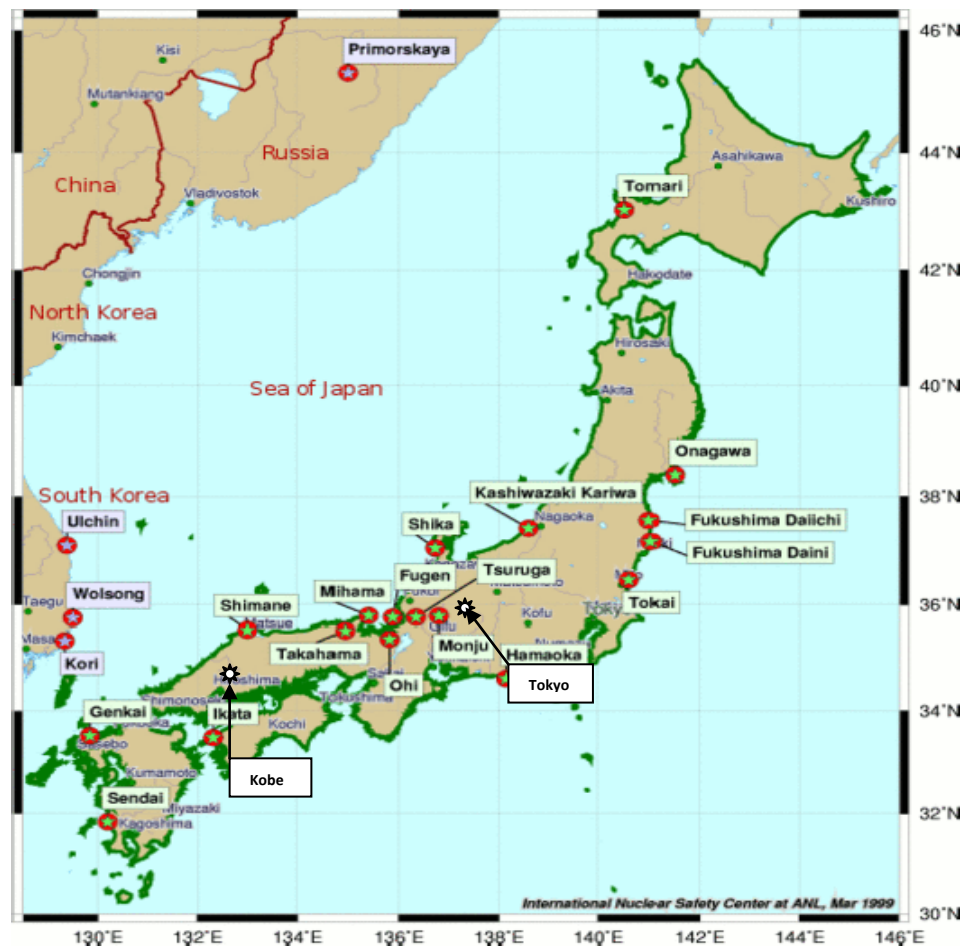
Nuclear energy has been a national strategic priority since 1973, recently moving to accelerate development of fast breeder reactors. In 2007 the government selected Mitsubishi Heavy Industries (MHI) to be the core company to develop this new technology. This was backed by government ministries, the Japan Atomic Energy Agency (JAEA) (Japan Atomic Energy Agency 1956) and the Federation of Electric Power Companies of Japan. FEPC Japan had expected electricity supply from nuclear power to increase to 40% by 2019 (FEPC Japan).

This was typical of the Japanese top-down style of setting national priorities, with major companies forming a part of the national strategy determination process. This was consistent with historical patterns of decision-making from the Shogunate, through the Meiji restoration and including the MacArthur military and civil administration (Omura 2010). This system has been very robust and stable over time, and it is only the current emergency situation that suggests it may break down, given the whole energy policy is now under review following the 2011 Fukushima accident.

## **3. Effects of Tsunami – Plants out of action and reduction in power**

The Tokyo Electric Power Company (TEPC), owner of the Fukushima plants, and supplier of about one third of the country's electricity, reported that in mid May 2011 it was operating at one third of its previous capacity at the three Plants.

Figure 1: Japan Nuclear power plants map (15 March 2011)



source : <http://www.insc.anl.gov/pwrmaps/>

The World Nuclear Association reported that only 17 out of Japan's 50 remaining nuclear power reactors were in operation in mid 2011, supplying 30% of the electricity previously available from Nuclear energy (World Nuclear Association 2012). By January 2012 only three of Japan's 50 nuclear plants were in operation. Chubu Electric, owner of the Hamaoka nuclear power plant had already given an order in May 2011 to shut it down because it lies on a tsunami-prone coastline.

#### **4. Responses to disaster with regard to power supply**

In mid 2011 the Japanese government formulated an energy saving execution plan, and declared that the country should reduce consumption of electricity by 15%. A 12% reduction was achieved, but reduction in peak demand was actually 18% because public concern was so great. In July 2011, after the 11 March Fukushima meltdown, the Government ordered the nuclear authorities to conduct tests on all reactors (World News 2011). These have been progressively shut down for testing since and still await approval to reopen.

However, experts have doubted the reliability of Japan's nuclear plant testing (McCurry 2012). The Guardian, a major UK newspaper, reported on 9 January 2012

that Mr Hiromitsu Ino, an emeritus professor at Tokyo University and a member of the nuclear safety agency advisory panel, said the tests were flawed because they had been introduced before the full facts of the Fukushima disaster were known.

In October 2011 the Japanese government published a White Paper confirming that “Japan’s dependency on nuclear energy will be reduced as much as possible in the medium-range and long-range future” (World Nuclear Association 2012). The White Paper also highlights weaknesses in the energy system and says that a new energy policy will be developed by Japan’s ministerial-level Energy and Environment Council by August 2012 (World Nuclear Association 2012). Prime Minister of Japan, Mr. Noda, said that the national Basic Energy Policy would be revised from scratch. Even though this indicates a shift in government attitude, it is still a top-down approach to decision-making.

In March 2012 Japan Atomic Industrial Forum (JAIF) announced that 35 nuclear reactors might be restricted in their output and the future of others was uncertain. Therefore, Japan has been through another summer of electricity shortages, particularly noticeable in limited air-conditioning. Another negative outcome has been that carbon emission had risen 14% above 1990 level, and the cost of additional fossil fuel imports was \$40 billion per year (over \$300 per person).

In early January 2012, International Atomic Energy Agency experts began a review of safety tests, but the Agency says it is the responsibility of the Japanese government to approve re-opening. The last domestic nuclear power plant was shut down for safety testing on 5 May 2012, and Japan’s nuclear supply had become a “zero” for the first time in 42 years (McCurry 2012).

According to the newspaper Asahi Shimbun, on 16 June 2012, Japan’s Prime Minister, Mr. Noda, agreed to the re-running of the plant at Oi-cho, (Fukui Prefecture) and for Kansai Electricity Power Corporation (KEPCO) to start Unit 3 and 4 operations at full capacity in early July (2012). Actual approval was given by the local Fukui Prefecture and Nuclear power operation rate regained to 2.9% from 0% on 13 August (Yomiuri Newspaper 2012).

Eighteen months after the Fukushima melt down, experts inside and outside Japan are still expressing grave doubt about the reliability of all the safety testing and the whole issue is becoming very controversial.

## **5. Public Opinion**

The Japanese people believed in the peaceful use of nuclear energy as a clean source of energy and were happy to support government policy and increase reliance on it. Japan’s newspaper, Asahi Shimbun reported in their 2007 poll that only 7% of Japanese wished to use alternative to nuclear energy (Asahi-Shinbun 2007). This increased to 11% in April 2011, a month after the March 2011 disaster. In November 2011, the number further increased and 70% of Japanese voted for elimination of nuclear plants and 93% of people support the increase of renewable energy, although accepting the use of nuclear energy in the short term (Yomiuri-shinbun 2011a).

Clearly, there has been a change in the attitude of Japanese people. They trusted Government policy in the past but now they doubt it. They have discovered that before the disaster, the Japanese Government was not transparent and covered up inadequate safety procedures and inspections (Acton & Hibbs 2012). Even during the disaster, when Fukushima was shut down, important information was withheld by the government from the media. The Japanese people could not believe or rely on the government to release relevant information. Also the government backed Tepco financially to help compensate victims with about a one trillion yen injection of public funds (Sheldrick 2012). It is now known ex-Tepco CEO received a huge retirement bonus when he stepped down (Sheldrick 2012).

Public opinion is growing stronger and more important. Japanese commercial media traditionally support government policy and do not publish all opinions being expressed by Japanese people. So they seem to the world to be accepting of official reports. However social media are highlighting great changes in public attitudes. In May 2012, with all Japan's active nuclear reactors shut down for testing but waiting approval to reopen, protesters marched to call for a permanent end to nuclear power generation (Euronews 2012). Demonstrations against reopening of power plants were conducted on 5 May 2012 (Euronews 2012).

Figure 2: Anti-nuclear protesters march in Tokyo



Koji Sasahara/Associated Press (Euronews 2012)

Another example of the change in attitude to the dependence on Nuclear energy can be seen in a survey of citizens of Obu city (Aichi Prefecture), south-west of Tokyo, in May last year. It was carried out by Macromil, a leading Japanese online market research company. Obu is located on the West side of Japan and suffered some aftershock, although not seriously affected by Tsunami. However, it is close to major nuclear plants that are now being re-opened. Their survey shows that over 70% of Obu citizens have changed their views on Japan's future in energy supply as the majority now think that Japan should be using less electricity in the future and 93% support an increase in renewable energy. Thus there is a significant change in perception about where energy supply should be in 30 years (Macromil 2011). These attitude were reflected again in November 2011 in another Yomiuri poll which showed 71% choosing solar as a type of energy Japan should rely on the future (Yomiuri-shinbun 2011b).

Macromil also conducted the opinion poll about future energy of Japan among 1045 Japanese men and women aged 20 or over in Tokyo region, which suffered the

influence of the Fukushima nuclear power plant melt down (Macromil 2011). The opinion poll revealed that for over 70%, their lifestyle after the energy crisis has changed. People have changed their behaviour drastically. Over 50% have started saving electricity and joined those 44% who have always tried to save electricity. In total 95% are saving electricity. Over 90% would like to continue saving electricity even after the electric power shortage is over.

From a variety of surveys, Assistant Professor Matthew Penny comments, “it seems that Japanese public solidly behind government plants to fund solar energy research and development, and no longer imagines nuclear to be a long term option” (Penney 2012).

## **6. Green Future Power Alternatives**

Japan has been disrupted by the electricity shortages, but Japanese people are not confident that the Government has the situation under control. So Japanese business and individuals are looking to themselves for solutions. Overall trends in businesses and small farming operations are moving towards the micro-grid type of distributed energy and away from centralised energy distribution to local generated power sources.

Figure 3 shows an example of micro hydro power plant in Nasu Hyaku-mura which was established in 2009 as the first case for micro hydraulic power, where a small local generator is set up at for the irrigation of the rice field in Japan (Nasugahara Hyaku-mura 2012; Suwa 2009).

Figure 3: Micro hydro power generator is set at the irrigation of the paddy field



(Sources: Nasugahara Hyaku-mura power plant (2012; 2009))

This micro-hydro power generator system was introduced by ALCO Inc. (ALCO Inc. 2012). Alco Corporation (2012) who designed and manufactured a micro-hydro power generation system by a “spiral water wheel formula” for existing low drops in small streams (about 0.50 ~ 2.00m). This system has very easy maintenance as small leaves pass through. This is capable of supplying stable power. Possible power generation would be from 50 cm drops to 2m drops. There is no reliance on sun and there is stable 24 hours power.



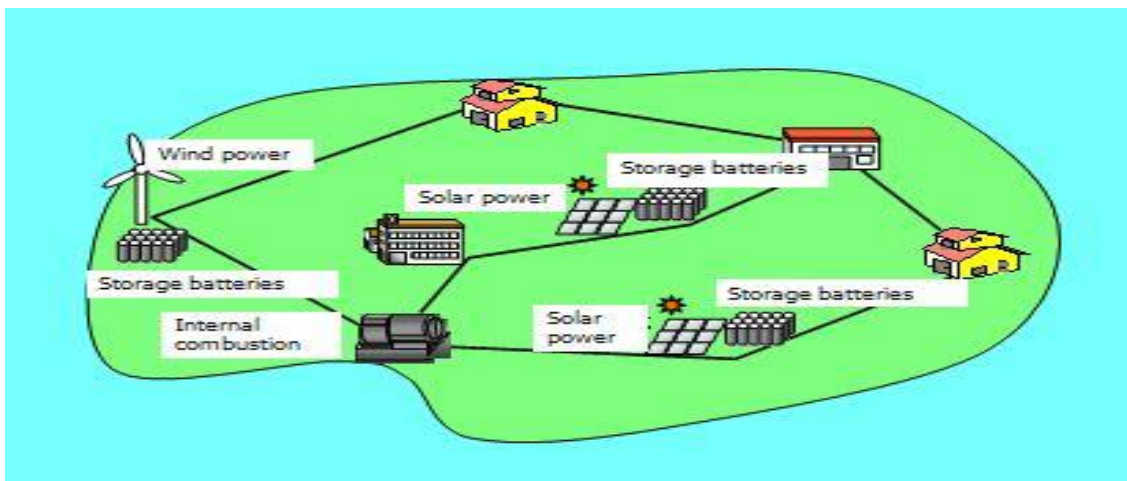
Figure 4: Micro hydrate power generator by ALCO Inc



. (Sources: ALCO Inc. 2012ALCO Inc. 2012)

There are many other examples of this trend away from the centralised power supply. The Fuji Electric company invented the micro-grid type of distributed energy (Ibaragi, Suzuki & Nii 2009). The Kyoto Eco-Energy Project (KEEP) is conducting the research in new energy plants with seven participating entities, Fuji Electric, Kyoto Prefecture, Kyotango City, Amita Company, Obayashi Corporation, Nissin Electric Corporation and Nomura Research Institution. KEEP uses the combined power sources of wind power and solar energy and constructed a new energy supply system (Takahashi, Kanazawa & Suzuki 2011), illustrative in the image from the Imperial College of London (Figure 5).

Figure5: The Microgrid - Village Energy, A systems –Based



(Source: Imperial College of London)

Figure 6: Tokyo Skytree (Tokyo Japan )



Another example of distributed energy and away from centralised energy distribution to local generated power sources is Tokyo Skytree (Figure 6). It was officially opened to public on 22 May 2012 as the world's tallest communication tower (634 meter-tall). The Skytree was constructed for not only to survive the strong earthquakes that regularly occurred, and can offset up to 50 per cent of the earthquake energy that will hit the tower, but also this is Japan's first district heating and cooling (DHC) system that would be utilized geothermal energy to supply for a 10.2-hectare area in Tokyo. The basic idea was to use of temperatures in the ground remain at about 15 to 17 degrees throughout the year, the geothermal energy system utilizes the earth as a heat source in the winter and heat sink for cooling in the summer.

On 18 June, the Japanese Industry Minister Yukio Edano announced the introduction of feed-in tariffs (FIT). This means that government is ready to pay higher rates for renewable energy. Leading research-driven agency broker, CLSA Asia Pacific Markets estimates that this would expect to raise revenue from renewable generation and related equipment to more than \$30 billion by 2016. Utilities will pay 42 yen (US\$0.53) per kilowatt hour (kwh) for solar-generated electricity, (double that of Germany), and pay 23 yen per kwh for wind power, whereas in Germany 4.87 euro cents (USD0.06) is paid. The government estimates renewable energy to increase to 22,000 megawatts by the end of March 2013. This announcement has encouraged Japanese large corporations to construct mega solar power system in rural areas of the Kyushu, the south island of Japan, such as Fukuoka, Nagasaki and Kagoshima.



Figure 7: Mega solar panels in Kyushu 2012



**(Source: Mitsubishi Corporation)**

## **7. Conclusion**

Tokyo, once a city of light, is now willing to cut down on excessive power usage for the benefit of the nation (Shears 18 March 2011).

The 2011 disaster had a major and disruptive effect on energy supply in Japan. But it may bring about more fundamental societal changes. This research reveals that there are positive outcomes emerging, including expanding the government policy for the eco-model city initiative. In September 2012, Japan's Municipalities and Japanese conglomerate such as Mitsubishi Corporation, Kyocera, Sharp, NTT constructed a mega solar power unit in the south-west of Kyushu Island (HighBeam Business 2012). The Japanese people are becoming more vocal about government policies and Japanese society is starting to focus on energy saving strategies leading to sustainable lifestyles. These will be beneficial to future generations. The Japanese people are moving on from grieving by focusing on finding new solutions to their community problems.

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